The U.S. Grapefruit Market

Suzanne Thornsbury and Thomas Spreen[1]

Abstract: Although geographically concentrated within four States, U.S. commercial grapefruit production accounts for approximately one-half of world output. Even with such a large share of world production, the U.S. industry has not been exempt from the changes currently impacting national produce markets. Forces of change include competition among production regions, retail buying practices, changing consumer preferences, and globalization. At least partially in response to stagnant domestic demand, the U.S. grapefruit industry has actively pursued global markets through bilateral and multilateral negotiations. Although adverse movements in exchange rates and global economic slowdowns have added additional sources of risk, the industry has been successful in penetrating and maintaining new markets. Even so, periods of over-production periodically disrupted by freeze events resulting in severe supply disruptions have established a classic price and production cycle, albeit longer than in many commodities.

Keywords: grapefruit, price-production cycle, market channels.

The United States has produced approximately 15 percent of world citrus on average since 1990, including almost one-half of the world's supply of grapefruit and pommelos (FAO 2000).[2] Although the U.S. proportion of world production declined slightly in the 1990's, it still remains high at over 47 percent. Even with such a large share of the market, the U.S. grapefruit industry has not been exempt from changes currently facing domestic produce markets. The purpose of this special article is to highlight the forces of change affecting U.S. grapefruit markets, including impacts and challenges from crop physiology, weather, retail buying practices, domestic consumer demand, and globalization. The grapefruit industry has often been proactive in their attempts to meet such challenges but has not been able to break free from a classic price and production cycle.

Production

Climatic factors and a high heat requirement for quality production limit the geographic boundaries of commercial grapefruit supply, both worldwide and domestically, to tropical or subtropical climates. Worldwide, the United States, Israel, Cuba, South Africa, Argentina, and Mexico account for over 80 percent of production (FAO 2000). In the United States, production is primarily concentrated in a sub-tropical zone between 25^0 and 35^0 north latitude which is subject to periodic freeze events.

Only four States, Florida, California, Texas, and Arizona, produce grapefruit commercially in the United States. On average between 1989/90 and 1998/99, the four States contained 76, 12, 9, and 3 percent of the national grapefruit bearing acreage, respectively (fig. B-1). Acreage in California has remained relatively constant over time, while acreage in Arizona, with increased competition for space and water for urban use, fell during the 1990's. The greater variability in bearing acreage in Florida and Texas was often influenced by weather events.

Even within the four grapefruit producing States, production is highly concentrated geographically, increasing the industry's exposure to catastrophic weather or other production events (fig. B-2). With the majority of U.S., and thus world, production occurring in relatively small areas within semi-tropical regions, grapefruit supply has been particularly susceptible to weather-related risks associated with frost or freeze conditions. The amount of damage from freezing temperatures can vary from fruit quality damage, to fruit

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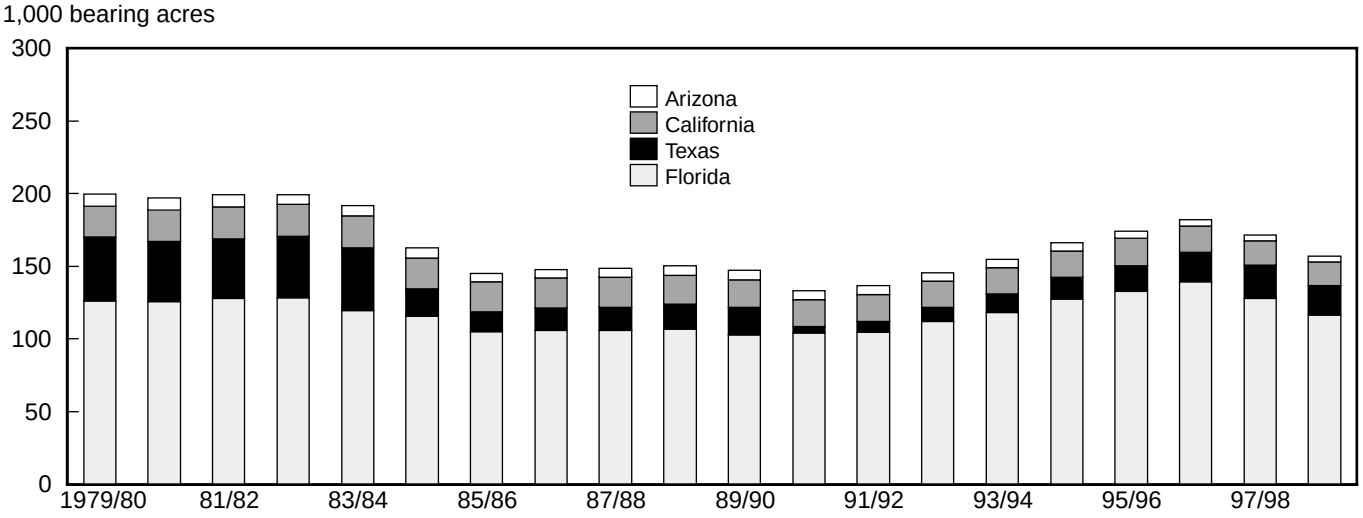
[1] Assistant professor and professor in the Food and Resource Economics Department, University of Florida/IFAS, Indian River Research and Education Center and Gainesville, respectively. The authors gratefully acknowledge Tara Minton for her research assistance. This special article was supported under a cooperative agreement between the USDA Economic Research Service and the University of Florida (cooperative agreement number 43-3AEK-0-80027).

[2] Grapefruit (*citrus paradisi*) are often classified as a subspecies or botanical variety of pommelos (*citrus grandis*) which generally are larger, have a firmer flesh texture and lower juice content than grapefruit. Pummelo production on a commercial basis has been restricted to a limited geographic area within East Asia (Reuther, Webber, and Batchelor 1967; Saunt 2000). If the FAO data for pummelos could be separated from that of grapefruit, the United States would be expected to have a larger share of world grapefruit production.

Figure B-1

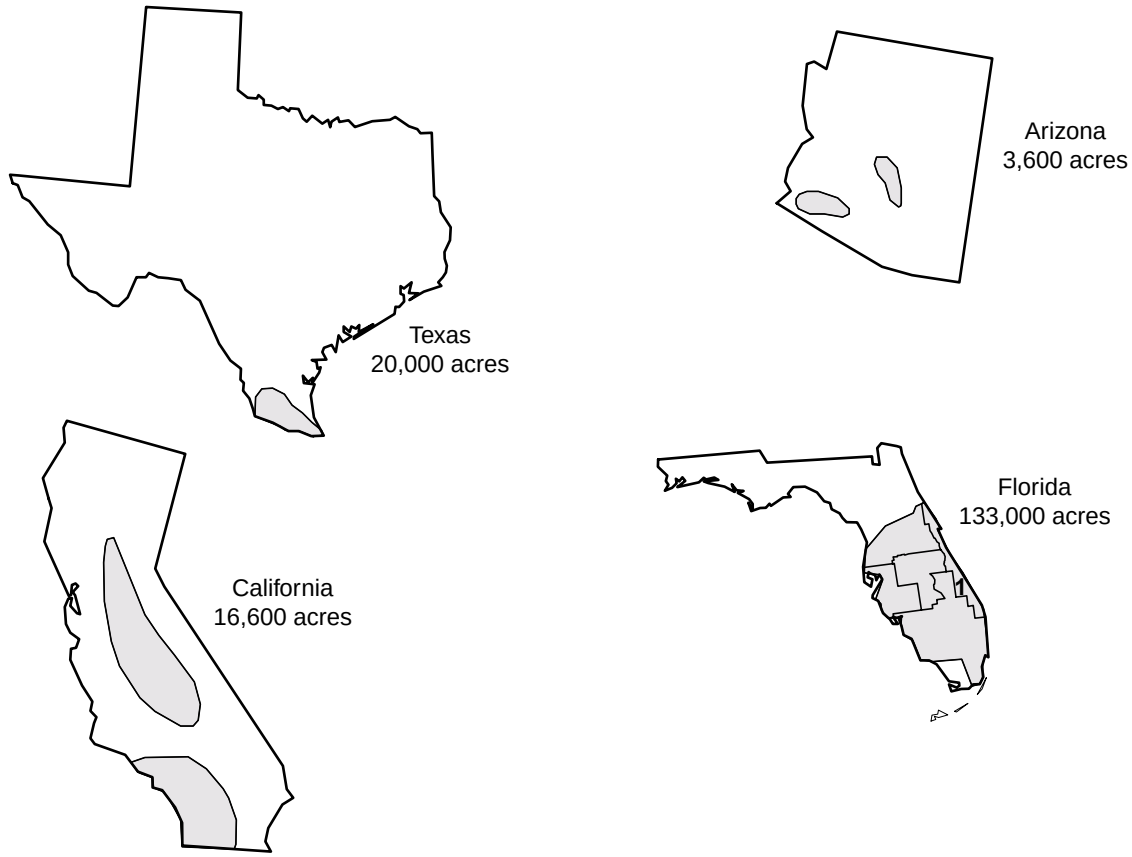
U.S. grapefruit bearing acreage



Source: Florida Agricultural Statistics Service, (2000).

Figure B-2

U.S. citrus producing areas and grapefruit bearing aceage, 1998/99



Source: Florida Agricultural Statistics Service, (2000).

loss, to total tree destruction depending on the severity of the weather event.

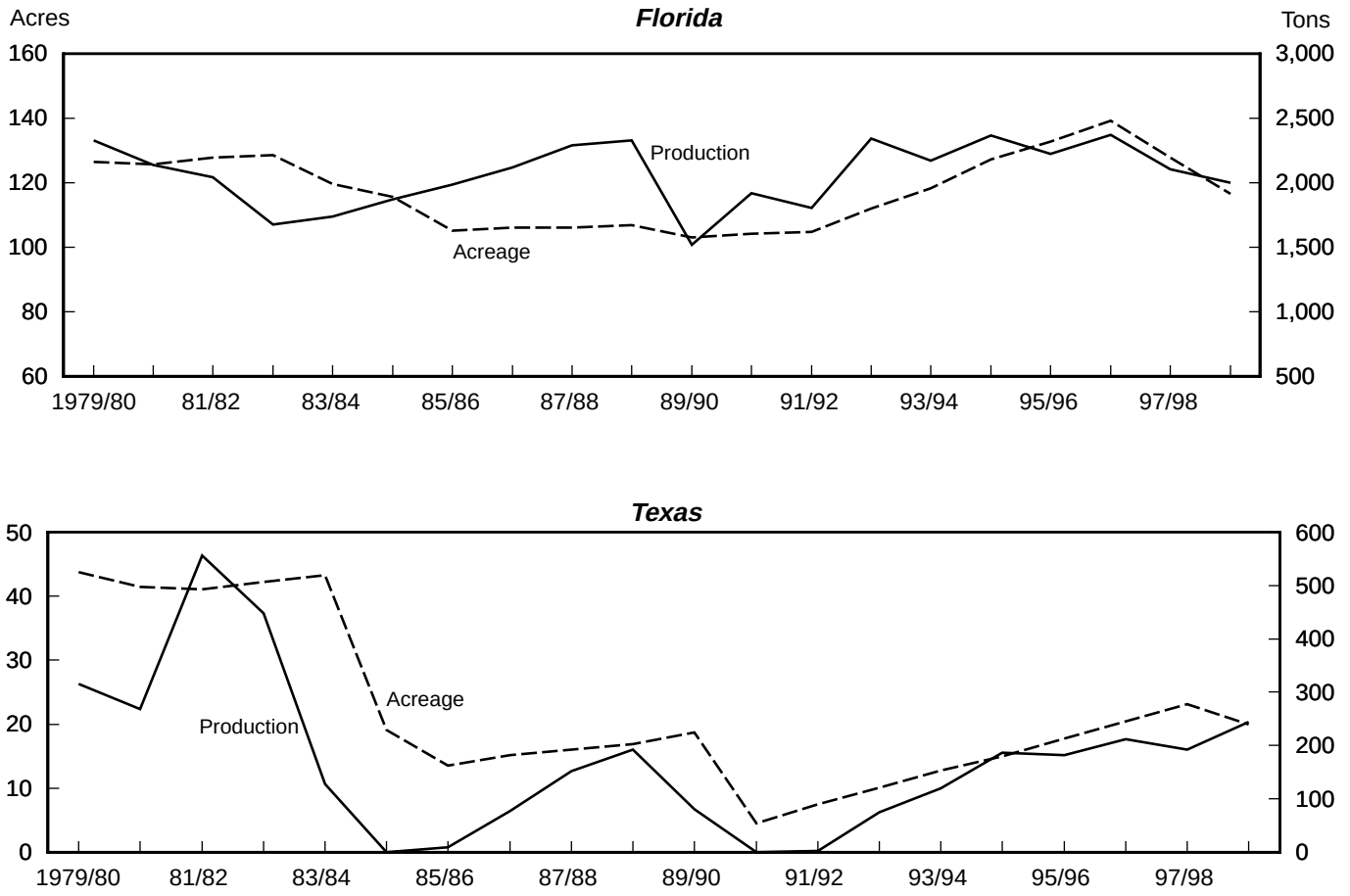
The first recorded U.S. citrus freeze occurred in Florida in 1835. More recently, moderately severe freezes were recorded in the State during 1977, 1981, and 1982, with severe freezes occurring in 1983, 1985, and again in 1989. Not only were annual output levels impacted by weather, but the severe freezes resulted in a significant portion of acreage being lost and a longer cyclical pattern developed in output. Freezes have also disrupted grapefruit production in other States; most notably, the December 1983 and December 1989 Texas freezes when marketings during 1984/85 and 1990/91 were zero (fig. B-3). Again a longer pattern of recovery can be seen after catastrophic freeze events when compared with other horticultural crops.

Supply recovery is longer than that of most horticultural crops due to the lengthy period between tree-set and maturity in grapefruit, and hence to harvesting the first crop of sufficient volume to be economically viable. Most grapefruit trees will begin bearing 2 to 3 years after planting, but initial yields may not cover the cost of harvesting. In most cases, economically viable productivity levels are not achieved until the fifth or sixth year after planting. Trees typically remain highly productive for approximately 20 years and can continue production, with only moderate yield decline in subsequent years, baring substantial damage from weather, pests, or mismanagement. Therefore, even if supply and demand signals are efficiently passed through the market, there are still significant lags in the industry's ability to respond.

Even within a single producing State, weather patterns have impacted the physical location of grapefruit production. Over time in Florida, growers have moved south to locations less vulnerable to freeze (table B-1). Currently data are recorded for five citrus-producing areas within the State; however 1980's freezes destroyed almost all the citrus in the northern areas. Recent evidence collected from Florida grapefruit shippers confirms this pattern. Of the firms inter-

Figure B-3

Florida and Texas grapefruit bearing acreage and production



Source: Florida Agricultural Statistics Service, (2000).

viewed, 37 percent reported decreasing product sourced from the central region over the last 5 years, while 50 percent report increasing the percentage sourced from the southwestern regions.

There are factors, other than freeze risk, that influence product sourcing patterns within a State, including the need to extend the supply season. The warmer weather of the more southern Florida regions allows grapefruit to reach maturity faster, and thus access the early-season market. Although the marketing season for Florida begins September 10, grapefruit harvest normally begins in September in Southwest Florida and October in the other regions of the State and extends until July 31. Marketing seasons are November 1 to July 31 in Arizona, November 15 to October 30 in California, and October 1 to May 30 in Texas.

Variations in acreage alone may mask other changes in output. As with most crops, there have been agronomic changes in commercial grapefruit production. Tree plantings for all varieties are much denser in the 1990's than during earlier decades, allowing for greater output and lower harvesting cost per bearing acre (fig. B-4). U.S. grapefruit yields averaged 15.2 tons per acre between 1971 and 1979, 15.3 tons per acre between 1981 and 1989, and 16.9 tons per acre between 1991 and 1999 (FAO 2000).

Both white and red (or colored) grapefruit are produced in seedy and seedless varieties, although seedy fruit accounts for a much smaller, and declining, portion of the commercial market (fig. B-5).[3] Red varieties have accounted for an increasing share of U.S. production in the 1990's. Recent interviews with Florida grapefruit shippers identified an average 8 percent decrease in shipments of white seedless grapefruit over the last 5 years.

[3] Seedless fruit is defined as having six or fewer seeds.

Table B-1--Average annual grapefruit production by Florida region 1/

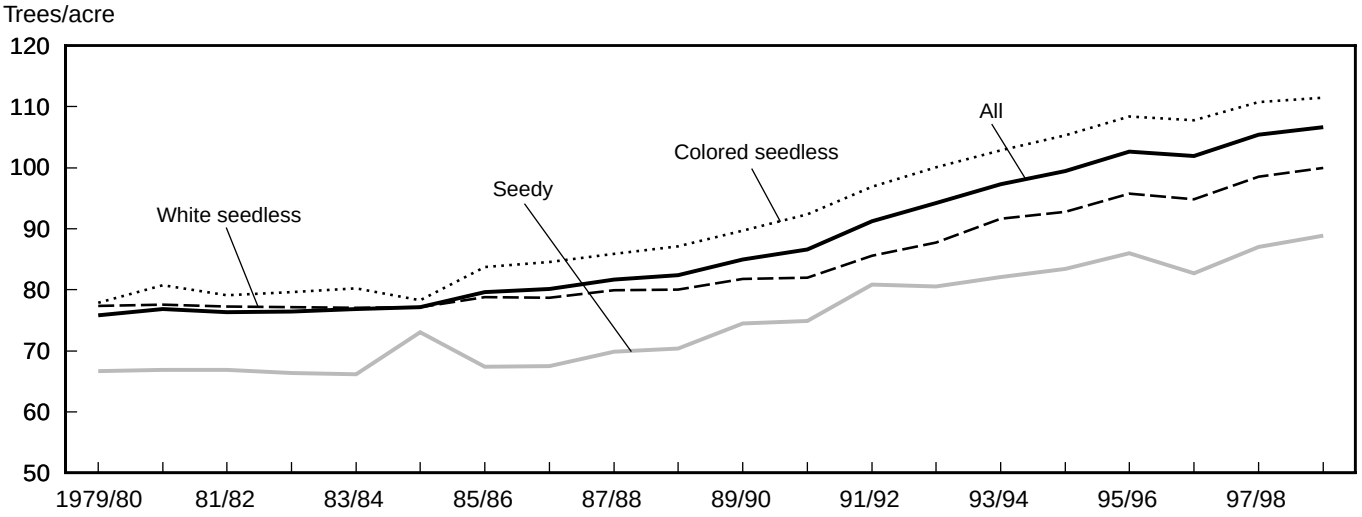
Years	Indian River	Northern	Central	Western	Southern
			1,000 boxes		
1966/67-1969/70	10,129	6,333	8,511	2,376	--
1970/71-1974/75	17,661	6,683	9,377	1,859	--
1975/76-1979/80	21,968	6,776	12,486	2,029	--
1980/81-1984/85	24,130	3,821	10,885	1,466	--
1985/86-1989/90	30,280	267	6,758	1,164	6,991
1990/91-1994/95	32,480	304	5,021	1,810	8,884
1995/96-1998/99	33,675	478	5,373	1,864	9,011

1/ Regions were adjusted between the 1984/85 and 1985/86 reporting seasons. Prior to that time regions were defined as East Coast (Indian River), Upper Interior, Lower Interior, and West Coast, and data were not kept separately for the Southern region.

Sources: Florida Agricultural Statistics Service (2000) and authors' calculations.

Figure B-4

Grapefruit trees per bearing acre in Florida



Source: Florida Agricultural Statistics Service, (2000).

Figure B-5

Florida grapefruit production by type

Source: Florida Agricultural Statistics Service, (2000).

Grapefruit are utilized in both the fresh and processed (primarily juice) market. The end use determines fruit characteristics that are desirable. Appearance is very important in the fresh market, where a regularly shaped fruit with little to no exterior blemishes is considered ideal. Seedless fruit is preferred in this market. In the processed juice market, juice color and content, high solids, and a low degree of bitterness are important fruit characteristics. Currently, white grapefruit primarily enters the juice and fresh export markets. Red grapefruit primarily enters the domestic fresh market, although as blended juice technology has evolved, an increasing amount of colored grapefruit has been processed.

From 1993/94 to 1998/99, on average, 51 percent of U.S. grapefruit production went into the processed market (FASS 2000). End use allocation varied substantially between States, reflecting both the volume of production and processing capacity in Florida and the influence of weather on fruit appearance; it is more difficult to produce blemish-free fruit under humid conditions. On average, 58, 28, 31, and 32 percent of the Florida, California, Texas, and Arizona production was utilized in the processed market.

Price-Production Cycles

Grapefruit is a commodity that has undergone periods of over-production periodically disrupted by freeze events resulting in severe supply disruptions. As a result, the U.S. grapefruit industry has demonstrated classic economic price and production cycles, albeit longer than in many commodities (fig. B-6). Unlike many produce industries, there can be significant costs associated with exit from grapefruit production limiting growers' season-to-season ability to adjust production levels. Permanent exit entails, at minimum, the cost of tree removal. There are also sunk costs at the packing/processing levels that contribute to continued excess capacity within the industry.

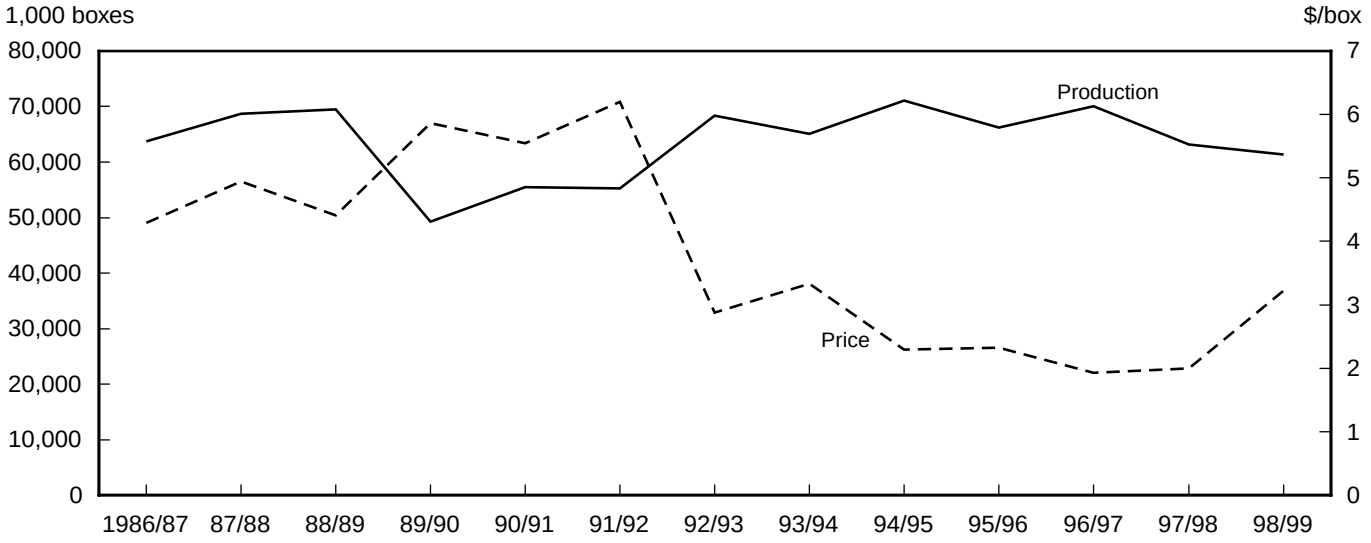
Physiologically grapefruit are non-climatic, therefore the fruit remains on the tree as it passes through the immature, mature, and over-mature stages of development, and changes occur very slowly over a long period of time compared with other noncitrus fruits, such as peaches or apples (Jackson and Davies 1999). Standards for maturity are defined by State law in each of the citrus growing States, and Federal statutes apply to interstate commerce. In addition, after harvest the quality of the fruit does not deteriorate rapidly unless there is damage. There is a relatively long time to harvest and ship fruit compared with other produce items. Thus, within a season, there is more opportunity for growers and shippers to manage supply in response to market signals.

Fruit may be sold by the grower to a shipper as either a cash sale (where the buyer assumes the market price risk) or in a participation arrangement (where the grower retains the price risk and pays the buyer a fixed marketing fee). Traditionally, when the crop is ready, a harvester is contracted to arrange for the picking, roadside (moving to the end of the row), and hauling of fruit. Depending on the sales arrangement, the harvester may be contracted by the grower or a shipper, packinghouse, or processor who has bought the fruit.

There are significant differences in price per box, and grower returns, for grapefruit in the fresh and processed markets (fig. B-7). Since in many years the processed market serves as a residual demand for fresh grapefruit, the price differentials are increased in times of oversupply. Once fruit is harvested, it can be sent to a packinghouse for uti-

Figure B-6

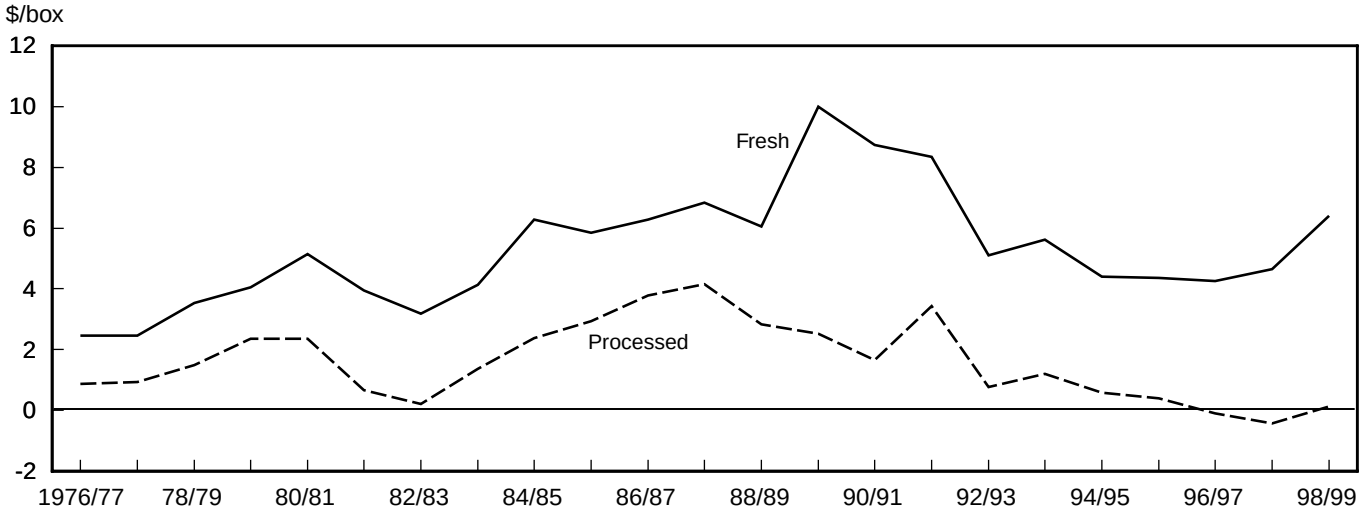
Total U.S. grapefruit production and equivalent on-tree price



Source: Florida Agricultural Statistics Service, (2000).

Figure B-7

U.S. equivalent on-tree grapefruit grower returns



Source: Economic Research Service, USDA.

lization in the fresh fruit market or sent directly to a processor. If fruit is first sent to the packinghouse, eliminations, the portion of fruit that does not meet fresh standards after grading, may then be sent to processing plants for conversion to juice or be discarded, depending on processor demand. The percentage of fruit sent to packinghouses that meets standard and is shipped fresh is referred to as the pack-out rate and will have a significant impact on grower returns. Pack-out rates are influenced by grading standards, quality of the crop, fresh utilization rates, and the extent that growers selectively harvest.

At harvest, fruit may also be sent directly to a processing plant which, is referred to as field-run processed. Growers with fruit that does not meet fresh standards will incur less cost by sending their product directly to the processing plant, as there are normally charges associated with the handling and transport of eliminations. During a particular growing season, individual growers have little control over their market allocation deci-

sion; external factors that influence fruit characteristics such as weather and earlier grove care decisions will largely determine quality and thus, given the demand by processors, end use.[4] Long-run grove care decisions, such as site and varietal selections, and pest control will influence end use.

Approximately 40 percent of the cost of production at the grower level is allocated for harvest expense (Muraro, Hebb, and Stover 1998). In low price periods, harvest and handling costs may exceed price, thus the on-tree price and corresponding grower returns can take on negative values. Regardless of the method of sale, grower returns are calculated as an on-tree equivalent value to allow annual comparisons. Price is calculated as a residual of the FOB price minus charges for harvest, roadside, hauling, marketing, assessment, and handling. Growers may choose to abandon or not harvest the crop for economic reasons. Approximately 3 million boxes of fruit were abandoned in Florida during the 1995/96 season and 6 million boxes were abandoned during 1996/97 (USDA/NASS 1999). Leaving a crop on the tree will have detrimental impacts on crop quantity and quality in subsequent years, so growers may choose to pick the fruit but never deliver it to market.

Marketing Channels

Instead of performing the marketing function individually, most packinghouses use a sales organization. There are two major sales organizations in Florida and several smaller ones. The sales organizations coordinate with packinghouses and buyers, receiving a fee for their services. Sales organizations are usually (but not always) private enterprises that source product from a mix of their own packinghouses and other houses affiliated either through formal or informal relationships. Individual packinghouses may also market their own product. These arrangements have become more common in the 1990's but still account for a relatively low share of total volume, relative to that shipped through the sales organizations. Traditionally, cooperatives have also played a large role in fresh citrus marketing. Members are individual growers or production cooperatives. Cooperatives are also active in processed grapefruit markets.

Like all produce industries, fresh grapefruit shippers have faced a number of changes in their markets over the last 5 years. Forces of change include competition from alternative production regions, retail buying practices, changing consumer preferences, and access to new markets. Since public data to assess the impacts of such changes are limited, primary data were collected through a series of written surveys and personal interviews that compared marketing practices over the last 5 seasons among fresh grapefruit shippers from all the producing regions of Florida. The firms included in the interviews accounted for over 54 percent of the volume of fresh Florida grapefruit sales (33 percent of U.S. volume) during the 1998/99 season. When the survey data were included, 65 percent and 40 percent of Florida and U.S. volume were represented.

The survey and interview results confirmed the public data for trends in fresh grapefruit sales. Among respondents, the amount of white grapefruit marketed fell by an average of 8 percent to 17 percent of sales over the last 5 seasons. There was an increase in grapefruit sourced from the southwestern region and a corresponding decrease sourced from the central region. The percentage of product sourced from the Indian River region remained approximately constant on average, although there were changes among individual firms. Shippers continue to procure 40 to 55 percent of their supply through their own or affiliated production. Among shippers organized as cooperatives, the percentage procured through cooperative arrangements increased by an average of 18 percent and ranged from 75 to 95 percent of total sales. Cooperatives did procure some product through other arrangements, primarily through participation agreements with independent growers.

Product bought through a participation arrangement where the grower receives a residual price and bears the market price risk have decreased almost 12 percent in the last 5 years. Although the majority of shippers interviewed reported decreased purchases (up to 40 percent) through this mechanism, there were some shippers who had increased participation purchases by at least an equal percentage. Cash sales that transfer at least partial, if not all, of the price risk to the shipper have increased by an average of 5 percent. Joint ventures and contract production are not commonly used by grapefruit shippers.

The perception among grapefruit shippers is that the total number of buyers for produce has decreased in the last 5 years, and on average, there were 95 regular buyers per firm in the 1993/94 season compared with 78 in the 1998/99 season. However, there were significant differences among firms. When the percentage change in the number of regular buyers for each individual firm was calculated, 25 percent indicated a decrease in the number of buyers, 12 percent indicated no change, and 63 percent indicated an increase. The average percentage change in the number of buyers across the firms interviewed increased 9 percent between 1993/94 and 1998/99.

Based on the interview results, total sales have not become significantly more concentrated. On average, the top four buyers accounted for 26 percent of total sales in 1993/94 and 29 percent in 1998/99. Conversely, the share of sales to the top 10 buyers decreased from 53 to 50 percent over the same period. Again, there was a great deal of variability among the firms, with 63 and 38 percent of respondents indicating increases in sales to their top 4 and top 10 buyers, respectively.

[4] This discussion draws heavily on "Fresh Versus Processed Utilization of Florida Grapefruit" by Brown, Spreen, and Muraro, which examines the allocation problem faced by grapefruit producers.

In addition to the number of buyers, the types of buyers for fresh grapefruit have changed over the last 5 years (table B-2). On average, sales to grocery retailers and retail cooperatives combined (such as Flemming or Associated Grocers) decreased about 4 percent between 1993/94 and 1998/99. The percentage of sales through mass merchandisers increased over the same period. Sales through produce wholesalers and distributors decreased; average sales fell 5 percent. Export markets have become more important, with an increase of over 5 percent of fresh product moving into the international markets on average from these shippers over the last 5 years. There has been increased product moving through brokers as well. Food service remains a very small market for fresh grapefruit.

Continued mergers among grocery retailers have led to growing concerns about changes in additional transactional arrangements, or off-invoice pricing, between retailers and shippers across all produce commodities. In the interview results, all shippers reported increased requests from buyers for fees and services. In general, shippers indicated that their response to requests depended on the specific request, cost of compliance, and the anticipated impact on firm resources.

When shippers were asked about specific types of fees and services, fees were perceived as much more harmful to their business than services. Specific fees and services discussed are listed in table B-3. Of the specific fees requested, only 8 percent were seen as beneficial by individual firms, compared with 34 percent of services. Approximately 62 percent of fees were seen as harmful, compared with only 15 percent of services.

At least partially as a result of changes in buyer types and market channels, there have also been changes in how prices are determined. According to the interview results, there has been an increase of over 4 percent in the use of seasonal or annual contracts for fresh grapefruit pricing. There have been corresponding decreases in the percentage of product priced through daily sales or short-term contracts. Shippers indicate they have undertaken a variety of strategies to better position themselves and their industry, including a specific marketing of product quality, extending both the length of time and types of citrus supplied, and export market development.

Table B-2--Average percentage of sales through specified market channels for fresh Florida grapefruit, 1993/94 to 1998/99

Market Channel	1993/94	1998/99
	Percent	
Grocery retailer	24.27	22.00
Retail cooperatives	10.82	8.82
Mass merchandisers	1.82	4.45
Produce wholesalers	15.18	10.09
Brokers	9.64	11.09
Food service buyers	1.55	1.73
Exports	36.73	41.82

Source: Grapefruit shipper interviews and surveys and authors' calculations.

Table B-3--Types of fees and services included in the grapefruit shipper interviews

Fees	Services
Fixed up-front slotting	Electronic data interchange
Volume rebates	Automatic inventory replenishment
Rebates, not tied to volume	Category management
Promotional allowances	Special merchandising displays
Free-product discounts	Private labels
Buy-back unsold product	Returnable containers
Capital improvement	Special packs
E-commerce fees	Food safety certification

Domestic Demand

Domestic per capita consumption of fresh grapefruit declined during the 1990's relative to the 1970's (fig. B-8). Population increases have raised total consumption slightly since 1992 but have not been enough to offset per capita declines from the previous decade. Total domestic shipments of fresh grapefruit have declined in the face of a strong domestic economy, increased population, and expansion of overall fruit consumption. Even among consumers increasingly aware of the health benefits of fresh fruit and vegetables, the largest increase in per capita fresh produce consumption has occurred in noncitrus fruits. Availability and quality of numerous fresh fruit alternatives has had a negative impact on grapefruit consumption. Consumers often find grapefruit a difficult fruit to use as it needs to be peeled, sectioned, can be too juicy and/or too tart, and is often associated with a breakfast food. Recent evidence suggests that per capita consumption of grapefruit is inversely related to age, with older consumers eating more. Unless the eating patterns of younger consumers change as they age, this will have significant negative impacts on future grapefruit demand.

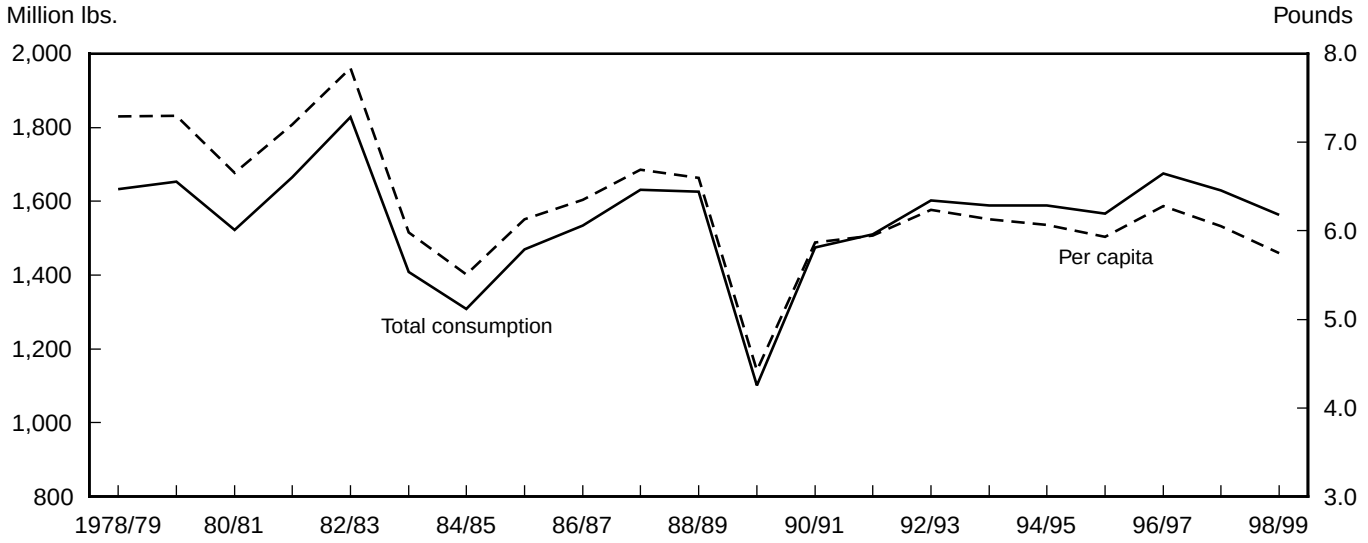
The grapefruit industry has begun a dual approach to promoting their product domestically. First is promotion of the intrinsic positive qualities of grapefruit as a natural source of quality nutrients. The "heart-healthy" advertising campaign is a visible sign of such efforts. Second is the development of alternative products or presentations of the fruit that address consumer concerns. The availability of fresh-peeled grapefruit (similar to pineapple) in retail outlets is one alternative under consideration.

Per capita consumption of fruit juices in the United States shows a pattern similar to that of fresh fruit. Grapefruit juice consumption has been relatively flat since the 1970's with substantial increases in noncitrus juice consumption. However, citrus juice still commands the largest share of the fruit juice market, given the strong demand for orange juice.

The grapefruit industry has responded to changes in consumer juice preferences, and there have been significant technological advances in grapefruit juice processing. In the 1970's and early 1980's, canned grapefruit juice accounted for a larger share of the market. Consumers were often

Figure B-8

Domestic consumption of fresh grapefruit



Source: Economic Research Service, USDA.

unhappy with the taste and consistency of the product, and by the 1990's very little canned grapefruit juice was being produced (fig. B-9). Demand for the canned product disappeared in the face of a more desirable product.

Development of frozen concentrated grapefruit juice (FCGJ), as well as the ability to include more of the colored fruit for improved visual appearance and taste, has shifted the industry towards a different product. Subsequent adjustments continue to be made in the processed grapefruit industry. Not-from-concentrate and blended juice products have become bigger components of the processed juice market for grapefruit in the 1990's as consumer demand for freshness and new tastes grow.

Juice is the storable form of grapefruit and as such, often acts as the residual commodity in the market. Not only does fruit go directly to the processed market but eliminations from the packinghouses are also delivered to the juice market. As a result, the inventory of FCGJ also displays a cyclical pattern (fig. B-10). Inventories increase between years of restricted supply and decrease following freeze events. Recovery of full productive capacity in both Florida and Texas after the freezes of the 1980's pushed juice inventory levels to record highs by 1996/97. Not surprisingly, prices in the processed grapefruit market are counter-cyclical with inventory and the U.S. average on-tree price reaching a low of -$0.43 per box in 1997/98.

Export Demand

Partially as a consequence of stagnant domestic demand, the U.S. grapefruit industry is looking outward and increasingly active in the global economy. Exports account for over 20 percent of all U.S. grapefruit production (fig. B-11). International markets are even more critical for specific products; approximately 68 percent of Florida fresh grapefruit were exported in the 1999/2000 season. During the 1990's U.S. exports were approximately 42 percent of world fresh grapefruit trade, 69 percent of world trade in grapefruit concentrate, and 28 percent of world trade in single strength grapefruit juice.

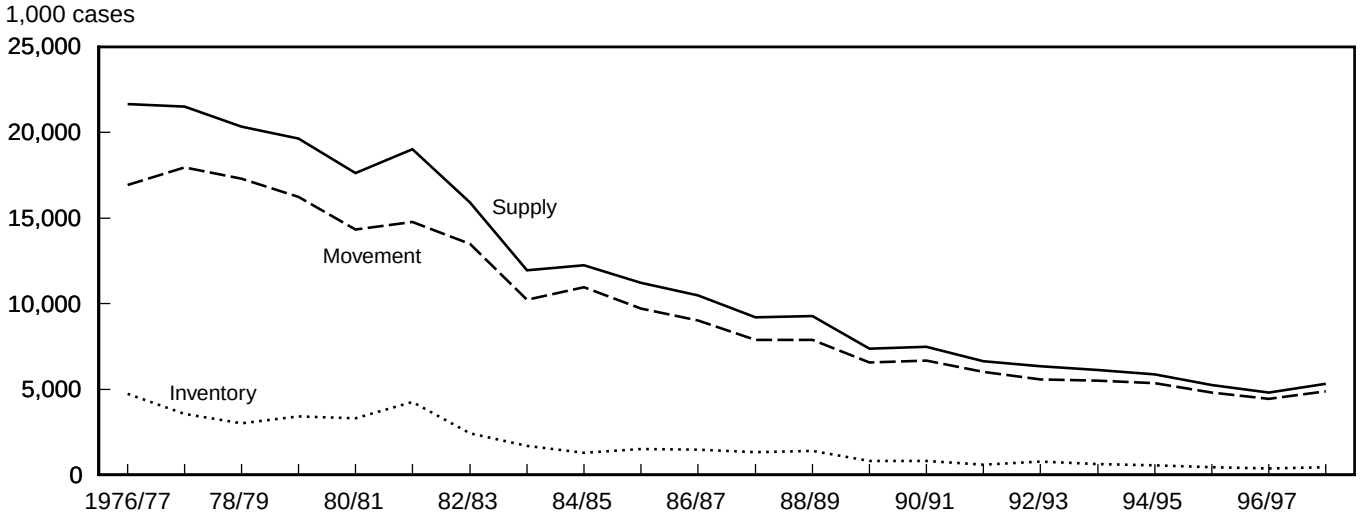
The Japanese beef and citrus agreement, signed in 1989, opened a significant new market for U.S. grapefruit exports. In the 1999/2000 season, 32 percent of all Florida fresh grapefruit sales were exports to Japan. Demand in this market is primarily for high quality white grapefruit, a product that does not sell well in domestic markets, although sales of colored grapefruit to Japan have increased in recent years. Along with increased exports to international markets has come increased exposure to global economic conditions. Grapefruit sales to the Asian markets underwent significant contractions during the 1990's, with declines in overall economic conditions. Again following the economic recovery, sales to these markets have begun to rebound.

The European Union (EU) is another important market for U.S. grapefruit, with over 9.5 million cartons of fresh fruit sold into this market in 1996/97. Sales to the EU have declined the last 3 seasons with sales of less than 7 million cartons projected for 1999/2000. The drop illustrates, at least partially, another risk faced by U.S. exporters: the U.S. dollar strengthened against most European currencies, making U.S. grapefruit more expensive relative to other supplies.

Nevertheless, the grapefruit industry has been active in pursuing new export opportunities. Recent negotiations over

Figure B-9

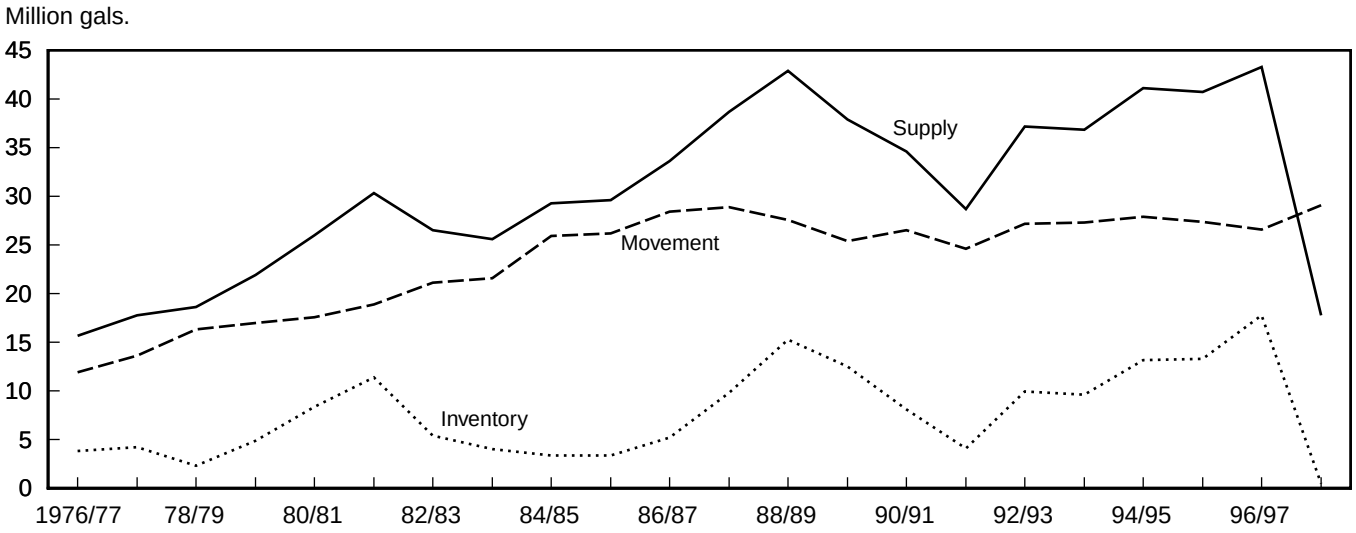
Supply and movement of U.S. canned grapefruit juice



Source: Economic Research Service, USDA.

Figure B-10

Supply and movement of U.S. frozen concentrated grapefruit juice



Source: Economic Research Service, USDA.

U.S. access to markets in China included the bilateral Agricultural Cooperation Agreement that was signed in April 1999 and formally lifted the ban on U.S. citrus exports to China. A March 1999 agreement opened citrus markets in India for mandarins, clementines, lemons, and grapefruit. In addition, a protocol over phytosanitary concerns was negotiated in 1999 with the Philippines to allow imports of Florida grapefruit, oranges, and tangerines. In June 2000, an agreement was signed that would allow restricted imports of citrus from Argentina to the United States. Lifting the ban on the import of Argentinean citrus has raised the expectations that the ban on Florida citrus exports to Argentina may also be lifted in the future. Worldwide, the EU is the largest importer of grapefruit, accounting for approximately one-half of the total volume. Other significant importers are Japan (13-18 percent), Canada (5-7 percent), and Poland (2-3 percent), with Argentina, the Russian Federation, and Switzerland at 1.5 percent each (FAO 2000).

There has also been an increased penetration of the U.S. market by imported grapefruit and grapefruit products. Imports as a percentage of domestic consumption was very

Figure B-11

Grapefruit imports as a percentage of U.S. consumption and exports as a percentage of U.S. production

Source: Florida Agricultural Statistics Service, (2000).

close to zero until the late 1980's but has ranged from 1 to 3 percent annually since the 1989 freeze. The desire of U.S. shippers to provide a year-round supply of product to their buyers has also provided an entry for imported grapefruit.

Conclusions

The U.S. grapefruit industry is facing mixed signals for the future. Geographically concentrated within four States, U.S. commercial production of grapefruit accounts for over one-half of world output. Periods of over-production periodically disrupted by freeze events resulting in severe supply disruptions have resulted in a classic price-production cycle. There remains excess production capacity in the domestic industry, and significant costs associated with entry and exit limit the ability for quick supply adjustments. At least partially in response to lagging domestic demand, the industry has aggressively pursued opportunities in global markets. Despite an expansion in export sales, it is not clear that the industry will be able to break the classic price-production cycles that have existed in the past. Domestic demand for grapefruit remains weak, and global demand is often subject to forces, some of which are beyond industry control, such as exchange rate variability, growth of foreign economies, and phytosanitary concerns.

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